CLAIMS

1. An electrical contacting device comprising:

a plurality of current paths connected in parallel to each other; and

a plurality of electrical contact points each having a first contact and a second contact that are mechanically opened and closed;

wherein each current path is provided with a corresponding one of the contact points, said each current path having electrical characteristics thereof adjusted to prevent arc discharge from occurring at the contact point.

2. The device according to claim 1, further comprising a plurality of resistors connected in series to the contact points, respectively, wherein for each current path, the adjustment of the electrical characteristic is performed by rendering a resistance of the resistor greater than a contact resistance of the contact point.

3. The device according to claim 2, further comprising: a base having a first surface and a second surface opposite to the first surface; a plurality of projections each disposed on the first surface of the base and having an apex; and a flat electrode which faces the first surface of the base and with which the projections come into contact; wherein the first contacts correspond to the apexes of the projections, the second contacts correspond to portions of the flat

electrode with which the apexes of the projections come into contact, and wherein the resistors are built in the base and the projections.

4. The device according to claim 3, wherein the base and the projections are integrally formed of a same material substrate.

5. The device according to claim 3, further comprising a common electrode formed on the second surface of the base and connected to the resistors.

6. The device according to claim 3, wherein the base is provided with a plurality of flexible structures each of which is disposed at a corresponding one of the contact points for absorbing contact pressing force acting between the first contact and the second contact.

7. The device according to claim 6, wherein each flexible structure comprises a beam having ends thereof fixed and is provided with a corresponding one of the projections.

8. The device according to claim 6, wherein each flexible structure comprises a cantilever beam and is provided with a corresponding one of the projections.

9. The device according to claim 2, wherein a maximum voltage applied to the contacting device is Vmax and a

minimum discharge current for each of the contact points is Imin, and wherein each of the resistors has a resistance greater than Vmax/Imin.

10. The device according to claim 1, wherein a maximum voltage applied to the contacting device is Vmax, a minimum discharge current for each of the contact points is Imin, and a total resistance of the contacting device is Rs, and wherein the number of the current paths is greater than Vmax/(Rs×Imin).

11. The device according to claim 1, wherein for each current path, the adjustment of the electrical characteristics is performed by adjusting a contact resistance of the contact point so that discharge current does not flow through said each current path.

12. The device according to claim 11, wherein a maximum voltage applied to the contacting device is Vmax and a minimum discharge current for each of the contact points is Imin, and wherein each of the contact points has a contact resistance greater than Vmax/Imin.

13. The device according to claim 1, wherein at least one of the first contact and the second contact is formed of one of a metal, oxide and nitride, each of these three substances containing a metallic element selected from a group of tantalum, tungsten, carbon and molybdenum.

14. The device according to claim 1, wherein at least one of the first contact and the second contact is formed of a material having a melting point no lower than 3000°C.

15. The device according to claim 3, further comprising a stopper for preventing the base and the flat electrode from approaching each other beyond an allowable minimum distance.

16. The device according to claim 3, wherein the base and the projections are formed of a silicon material which is at least partially doped with impurities for providing the resistors in the base and the projections.

17. A method of making an electrical contacting device including a fixing portion, a beam extending from the fixing portion and a projection provided on the beam, the method comprising:

a preliminary step for preparing a multilayer material substrate including a first layer, a second layer and an intermediate layer disposed between the first layer and the second layer;

a first etching step for subjecting the first layer to etching with use of a first mask pattern to form a projection in the first layer;

a second etching step for subjecting the first layer to etching until the intermediate layer is partially exposed and a beam is formed in the first layer, the second etching step being performed with use of a second mask pattern

covering the projection; and

a third etching step for making a space between the second layer and the beam by etching away a portion of the intermediate layer.

18. The method according to claim 17, further comprising the steps of: forming a conductive layer on the material substrate from a side of the first layer after the third etching step; forming a third mask pattern on the fixing portion to cover the conductive layer; and forming a wiring pattern on the fixing portion by subjecting the conductive layer to etching with use of the third mask pattern as a mask.

19. The method according to claim 17, further comprising two additional steps performed after the first etching step and before the second etching step, wherein one of the additional steps is a step for forming a conductive layer on the material substrate from a side of the first layer, the other of the additional steps being a step for removing the first mask pattern from the first layer.

24. The method according to claim 21, wherein the etching in the first etching step is isotropic etching.

20. The method according to claim 17, wherein the first layer and the second layer are formed of a silicon material, the intermediate layer being formed of silicon oxide.